



The Energy Story

Chapter 3: Generators, Turbines and Power Plants

As we learned in Chapter 2, electricity flows through wires to light our lamps, run TVs, computers and all other electrical appliances. But where does the electricity come from?

In this chapter, we'll learn how electricity is generated in a power plant. In the next few chapters, we'll learn about the various resources that are used to make the heat to produce electricity. In [Chapter 11](#), we'll learn how the electricity gets from the power plant to homes, school and businesses.

Most power plants are big boilers that burn a fuel to make heat. That heat energy is used to boil water to make steam. The steam is fed under high pressure to a turbine. The turbine spins and its shaft is connected to a turbogenerator that changes the mechanical spinning energy into electricity.

Lets look at a cross section of a power plant.

In most boilers, wood, coal, oil or natural gas is burned to make heat. Above that hot fire is a series of pipes with water running through them. The heat energy is conducted into the metal pipes, heating the water until it boils into steam. Water boils into steam at 212 degrees Fahrenheit or 100 degrees Celsius. The steam (red line) then goes under high pressure to the turbines.

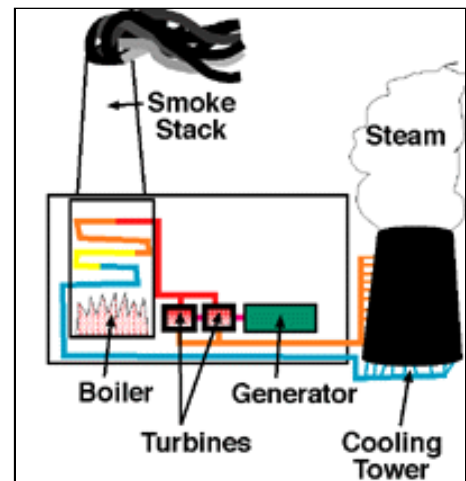
The turbine has many blades that look like the blades of a fan. When the steam hits the blades they spin a shaft that is attached to the bottom of the blades.

After the steam goes through the turbine, it goes to a cooling tower (orange line) where it cools off. It cools off and becomes water again. When the hot pipes come into contact with cool air, some water vapor in the air is heated and steam is given off above the cooling towers. This is not the same steam that is used inside the turbine.

The cooled water then goes back into the boiler (blue line) where it is heated again and the process repeats over and over.

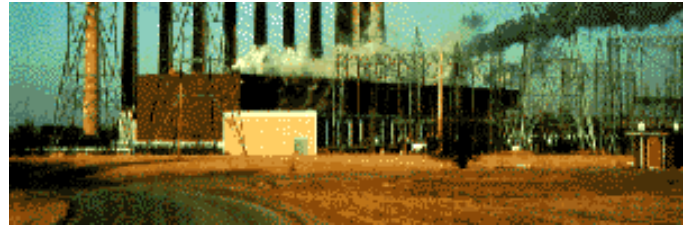
Most power plants in California use cleaner-burning natural gas to produce electricity.

Other power plants use nuclear energy to heat water to make electricity. Still others use steam or hot water found naturally below the earth's surface without burning a fuel. We'll learn about those energy sources



in the next few chapters.

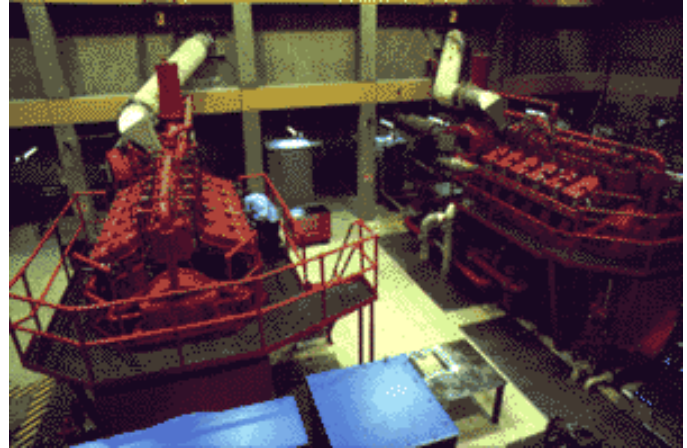
The turbine is attached by its shaft to the turbogenerator. The generator has a giant magnet inside a stationary ring wrapped with a long wire.



The shaft that comes out of the turbine and connected to the generator is turning. As the magnet inside the generator turns, an electric current is produced in the wire.

When a wire or any electrically conductive material moves across a magnetic field, an electric current is produced in that wire.

A generator is just like a "reverse" electric motor. Instead of using electrical energy to spin the motor and wheels, like in an electric toy car, the shaft from the turbines spins the motor and electricity is produced.

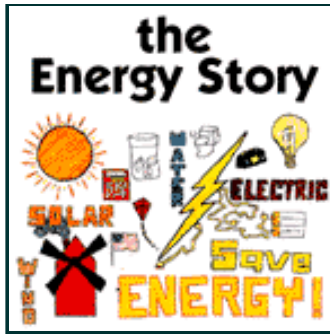


The electricity then goes to huge transmission wires that link the power plants to our homes, school and businesses. If you want to learn about transmission lines, go to [Chapter 11](#).

Here's What We Learned

1. Fuels are used to heat water in a boiler to make steam.
2. That steam turns a turbine.
3. The spinning shaft of the turbine drives the generator.
4. Many types of fuels are used in the boiler to heat the water.
5. When a wire or any electrically conductive material moves across a magnetic field, an electric current is produced in that wire.

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